

**WEST**[Generate Collection](#)[Print](#)**Search Results - Record(s) 11 through 20 of 22 returned.**☐ 11. Document ID: US 6267125 B1

L15: Entry 11 of 22

File: USPT

Jul 31, 2001

US-PAT-NO: 6267125

DOCUMENT-IDENTIFIER: US 6267125 B1

TITLE: Apparatus and method for processing the surface of a workpiece with ozone

DATE-ISSUED: July 31, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bergman; Eric J.	Kalispell	MT		
Hess; Mignon P.	Kalispell	MT		

US-CL-CURRENT: 134/102.1; 134/102.3, 134/148, 134/153, 134/902

## ABSTRACT:

An apparatus for supplying a mixture of a treatment liquid and ozone for treatment of a surface of a workpiece, and a corresponding method are set forth. The preferred embodiment of the apparatus comprises a liquid supply line that is used to provide fluid communication between a reservoir containing the treatment liquid and a treatment chamber housing the workpiece. A heater is disposed to heat the workpiece, either directly or indirectly. Preferably, the workpiece is heated by heating the treatment liquid that is supplied to the workpiece. One or more nozzles accept the treatment liquid from the liquid supply line and spray it onto the surface of the workpiece while an ozone generator provides ozone into an environment containing the workpiece.

25 Claims, 6 Drawing figures

Exemplary Claim Number: 25

Number of Drawing Sheets: 6

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWC
Drawn Desc	Image										

☐ 12. Document ID: US 6235122 B1

L15: Entry 12 of 22

File: USPT

May 22, 2001

US-PAT-NO: 6235122

DOCUMENT-IDENTIFIER: US 6235122 B1

TITLE: Cleaning method and cleaning apparatus of silicon

DATE-ISSUED: May 22, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Zhang; Hongyong	Kanagawa			JP
Sakakura; Masayuki	Kanagawa			JP
Goto; Yuugo	Kanagawa			JP

US-CL-CURRENT: 134/2; 118/715, 118/722, 134/100.1, 134/102.3, 134/27, 134/28

## ABSTRACT:

In a cleaning method and a cleaning apparatus of a silicon substrate, after wet cleaning or etching of the substrate having a silicon surface is carried out, and during or after a pure water rinse of the substrate, an oxide film with a thickness of 10 to 30 .ANG. is formed on the silicon surface by rinsing the substrate by pure water added with an oxidizer, and then the substrate is dried. Since drying is carried out after the oxide film is formed on the silicon surface, the occurrence of a water mark can be prevented.

42 Claims, 13 Drawing figures  
Exemplary Claim Number: 1  
Number of Drawing Sheets: 4

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC
Drawn Desc	Image										

☐ 13. Document ID: US 6227212 B1

L15: Entry 13 of 22

File: USPT

May 8, 2001

US-PAT-NO: 6227212  
DOCUMENT-IDENTIFIER: US 6227212 B1

TITLE: Semiconductor workpiece cleaning method and apparatus

DATE-ISSUED: May 8, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Konishi; Toko	Tokyo			JP
Ban; Cozy	Tokyo			JP

US-CL-CURRENT: 134/1.3; 134/28, 134/3, 134/33, 134/34

## ABSTRACT:

A semiconductor workpiece cleaning apparatus comprises a cleaning means of a semiconductor workpiece by use of cleaning liquid, charging means of drying liquid, and discharging means of the cleaning liquid. The cleaning means cleans the workpiece by spraying chemical liquid and/or pure water in a chamber, and/or by immersing the workpiece in the chemical liquid and/or pure water. The charging means takes in drying chemical liquid or vapor into contact with the processing chemical liquid or pure water in which the semiconductor workpiece is immersed. The discharging means discharges the processing chemical liquid or pure water interfaced by the processing chemical liquid or pure water.

19 Claims, 16 Drawing figures  
Exemplary Claim Number: 1  
Number of Drawing Sheets: 7

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KWIC

☐ 14. Document ID: US 6145519 A

L15: Entry 14 of 22

File: USPT

Nov 14, 2000

US-PAT-NO: 6145519

DOCUMENT-IDENTIFIER: US 6145519 A

TITLE: Semiconductor workpiece cleaning method and apparatus

DATE-ISSUED: November 14, 2000

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Konishi; Toko	Tokyo			JP
Ban; Cozy	Tokyo			JP

US-CL-CURRENT: 134/95.2; 134/902, 134/95.3

## ABSTRACT:

A semiconductor workpiece cleaning apparatus includes a cleaning arrangement that cleans a semiconductor workpiece by use of a cleaning liquid, a charging arrangement that brings into a chamber a drying liquid, and a discharging arrangement that discharges the cleaning liquid. The cleaning arrangement cleans the workpiece by spraying chemical liquid and/or pure water in the chamber, and by immersing the workpiece in the chemical liquid and/or pure water. The charging arrangement takes in the drying chemical liquid or vapor so as to contact the processing chemical liquid or pure water in which the semiconductor workpiece is immersed. The discharging arrangement discharges the processing chemical liquid or pure water while preserving an interface between the processing chemical liquid or pure water and the drying chemical liquid or vapor.

19 Claims, 16 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 7

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KWIC

☐ 15. Document ID: US 5964954 A

L15: Entry 15 of 22

File: USPT

Oct 12, 1999

US-PAT-NO: 5964954

DOCUMENT-IDENTIFIER: US 5964954 A

TITLE: Double-sided substrate cleaning apparatus and cleaning method using the same

DATE-ISSUED: October 12, 1999

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Matsukawa; Hiroyuki	Kumamoto			JP
Yonemizu; Akira	Kumamoto			JP
Matsushita; Michiaki	Yatsushiro			JP
Fujimoto; Akihiro	Yatsushiro-gun			JP
Takekuma; Takashi	Yamaga			JP
Yaegashi; Hidetami	Kokubunji			JP
Fukuda; Takahide	Kumamoto			JP

US-CL-CURRENT: 134/6; 134/18, 134/26, 134/32, 134/902, 15/77

ABSTRACT:

There is provided a double-sided substrate cleaning apparatus including a carrier station for loading/unloading a carrier in which objects to be processed are stored, a convey mechanism for conveying an object taken out from the carrier station, at least one cleaning mechanism, arranged along a convey path on which the convey mechanism conveys the object, for cleaning the object, and an object reversing mechanism, arranged along the convey path, for reversing the object.

4 Claims, 27 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 19

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Drawn Desc	Image								

KWIC

☐ 16. Document ID: US 5896875 A

L15: Entry 16 of 22

File: USPT

Apr 27, 1999

US-PAT-NO: 5896875

DOCUMENT-IDENTIFIER: US 5896875 A

TITLE: Equipment for cleaning, etching and drying semiconductor wafer and its using method

DATE-ISSUED: April 27, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Yoneda; Kenji	Kyoto			JP

US-CL-CURRENT: 134/102.3; 134/100.1, 134/102.1, 134/176, 134/179, 134/2, 134/26, 134/3, 134/30, 134/31, 134/37, 134/45, 134/902

ABSTRACT:

An equipment for cleaning, etching and drying a semiconductor wafer is provided with a process chamber having a closed space of which temperature is capable of being heated and adjusted by a heater; a mesh arranged at the center part in the process chamber and supporting at least one semiconductor wafer to be cleaned; a plurality of spray nozzles arranged in line at the upper part in the process chamber; and a rotary discharge nozzle arranged at the lower part in the process chamber. The spray nozzles spray chemical and ultrapure water with nitrogen gas in mist state, and the rotary discharge nozzle blows out chemical and ultrapure water as jet stream by rotation of a first arm and second arms thereof.

11 Claims, 9 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 9

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Drawn Desc	Image								

KMC

☐ 17. Document ID: US 5518542 A

L15: Entry 17 of 22

File: USPT

May 21, 1996

US-PAT-NO: 5518542

DOCUMENT-IDENTIFIER: US 5518542 A

TITLE: Double-sided substrate cleaning apparatus

DATE-ISSUED: May 21, 1996

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Matsukawa; Hiroyuki	Kumamoto			JP
Yonemizu; Akira	Kumamoto			JP
Matsushita; Michiaki	Yatsushiro			JP
Fujimoto; Akihiro	Kumamoto			JP
Takekuma; Takashi	Yamaga			JP
Yaegashi; Hidetami	Kokubunji			JP
Fukuda; Takahide	Kumamoto			JP

US-CL-CURRENT: 118/52, 118/232, 118/240, 118/244, 118/319, 118/321, 118/323, 118/503,  
118/58, 118/642, 118/66, 118/712, 118/72, 118/73, 134/902, 15/77, 15/88.2, 414/936,  
414/941

## ABSTRACT:

There is provided a double-sided substrate cleaning apparatus including a carrier station for loading/unloading a carrier in which objects to be processed are stored, a convey mechanism for conveying an object taken out from the carrier station, at least one cleaning mechanism, arranged along a convey path on which the convey mechanism conveys the object, for cleaning the object, and an object reversing mechanism, arranged along the convey path, for reversing the object.

23 Claims, 49 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 19

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Drawn Desc	Image								

KMC

☐ 18. Document ID: US 5464477 A

L15: Entry 18 of 22

File: USPT

Nov 7, 1995

US-PAT-NO: 5464477

DOCUMENT-IDENTIFIER: US 5464477 A

TITLE: Process for cleaning and drying ferrous surfaces without causing flash rusting

DATE-ISSUED: November 7, 1995

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Awad; Sami B.	Drexel Hill	PA		

US-CL-CURRENT: 134/1; 134/2, 134/26, 134/29

## ABSTRACT:

The present invention relates to an aqueous composition and process useful for cleaning and drying ferrous surfaces. According to the invention, a water-immiscible hydrocarbon or non-halogenated organic solvent cleaning step is followed by an aqueous displacement solution (ADS) which contains a surfactant component and a pH modifier component in sufficient amounts to substantially displace the hydrophobic organic solvent residue from the surface of the substrate and prevent its redeposition. The ferrous metal surfaces are then rinsed with hot deionized ultrasonically agitated water which comprises one or more water soluble basic components. This aqueous composition is capable of protecting ferrous metal surfaces from flash rusting after aqueous cleaning or solvent treatments of the surfaces, and particularly during the deionized water rinsing and drying steps.

12 Claims, 0 Drawing figures  
Exemplary Claim Number: 1

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Drawn Desc	Image								

KVMC

☐ 19. Document ID: US 5397397 A

L15: Entry 19 of 22

File: USPT

Mar 14, 1995

US-PAT-NO: 5397397

DOCUMENT-IDENTIFIER: US 5397397 A

TITLE: Method for cleaning and drying of metallic and nonmetallic surfaces

DATE-ISSUED: March 14, 1995

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Awad; Sami B.	Drexel Hill	PA		

US-CL-CURRENT: 134/1; 134/10, 134/26, 134/28, 134/3, 134/41

## ABSTRACT:

The present invention relates to an aqueous composition and improved process useful for cleaning and facilitate drying of various metallic and non-metallic surfaces or components. According to the invention the water-immiscible hydrocarbon or non-halogenated organic solvent cleaning step is followed by an aqueous displacement solution (ADS) which contains a surfactant component and a pH modifier component in sufficient amounts to substantially displace the hydrophobic organic solvent residue from on the surface of the substrate and prevent its redeposition. The improved process is an alternative for replacing the ozone depleting chlorofluorocarbons and Halogenated solvents (ODS) or other volatile organic solvents (VOC) being commonly used in cleaning variety of industrially manufactured metallic and non-metallic components. The present invention provides an effective method for removal of various light and heavy surface contaminants such as, but not limited to, fluxes, oils, waxes, buffing and lapping compounds, finger prints, silicone oils, metal forming lubricants, polymers and mold release compounds.

2 Claims, 0 Drawing figures  
Exemplary Claim Number: 1

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KVMC

☐ 20. Document ID: US 5288333 A

L15: Entry 20 of 22

File: USPT

Feb 22, 1994

US-PAT-NO: 5288333  
DOCUMENT-IDENTIFIER: US 5288333 A

TITLE: Wafer cleaning method and apparatus therefore

DATE-ISSUED: February 22, 1994

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Tanaka; Masato	Hikone			JP
Nishizawa; Hisao	Hikone			JP
Hirai; Nobuyuki	Hikone			JP
Shinbara; Kaoru	Hikone			JP
Yoshioka; Hitoshi	Hikone			JP

US-CL-CURRENT: 134/31; 134/11, 134/12, 134/30, 134/37

## ABSTRACT:

A wafer cleaning method and apparatus in which a cleaning solution is caused to evaporate at a temperature below its boiling point, and cleaning vapor thus produced is applied at a temperature above its dew point to a wafer such as a semiconductor wafer. The wafer is cleaned without formation of colloidal silica in the absence of aerosol, or etched uniformly free of impurities. The wafer cleaning apparatus comprises a cleaning solution storage, a vapor generating section, a wafer supporting position of a wafer supporting device and a vapor supply section. These components are arranged in a housing to overlap one another in plan view and to lie vertically close to one another. The apparatus has a compact overall construction with simplified seals for preventing leakage of the cleaning vapor.

12 Claims, 14 Drawing figures  
Exemplary Claim Number: 1  
Number of Drawing Sheets: 11

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KVMC

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Term	Documents
134/2.EPAB,JPAB,USPT,PGPB.	1895
134/2S	0
134/3.EPAB,JPAB,USPT,PGPB.	1916
134/3S	0
134/19.EPAB,JPAB,USPT,PGPB.	616
134/19S	0
134/26.EPAB,JPAB,USPT,PGPB.	1111
134/26S	0
134/30.EPAB,JPAB,USPT,PGPB.	935
134/30S	0
134/33.EPAB,JPAB,USPT,PGPB.	475
(L14 AND ((134/2 OR 134/3 OR 134/19 OR 134/26 OR 134/30 OR 134/33 OR 134/37 OR 134/902).CCLS.)).USPT,PGPB,JPAB,EPAB,DWPI,TDBD.	22

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# WEST Search History

DATE: Friday, November 22, 2002

<u>Set Name</u> side by side	<u>Query</u>	<u>Hit Count</u>	<u>Set Name</u> result set
<i>DB=USPT,PGPB,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=ADJ</i>			
L15	L14 and ((134/2 or 134/3 or 134/19 or 134/26 or 134/30 or 134/33 or 134/37 or 134/902).ccls.)	22	L15
L14	L13 and (cleaning or removing)	64	L14
L13	L12 and rotat\$	72	L13
L12	L11 and film	139	L12
L11	L10 and ozone	169	L11
L10	l3 and heating	2703	L10
L9	l4 and rotating	1	L9
L8	l4 and ozone	0	L8
L7	L6 and ozone	0	L7
L6	l3 and (heated solution)	20	L6
<i>DB=USPT; PLUR=YES; OP=ADJ</i>			
L5	l3 and (heated solution)	17	L5
L4	l2 and (heated solution)	17	L4
<i>DB=USPT,PGPB,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=ADJ</i>			
L3	spraying and (wafer or workpie\$e)	6114	L3
<i>DB=USPT; PLUR=YES; OP=ADJ</i>			
L2	spraying and (wafer or workpie\$e)	4257	L2
L1	6358325.pn.	1	L1

END OF SEARCH HISTORY

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L15: Entry 21 of 22

File: USPT

Jan 26, 1993

US-PAT-NO: 5181985

DOCUMENT-IDENTIFIER: US 5181985 A

TITLE: Process for the wet-chemical surface treatment of semiconductor wafers

DATE-ISSUED: January 26, 1993

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lampert; Ingolf	Burghausen			DE
Gratzl; Christa	Neuotting			DE

US-CL-CURRENT: 438/748; 134/11, 134/28, 134/31, 134/902, 438/750, 438/753

## ABSTRACT:

A process for the wet-chemical surface treatment of semiconductor wafers in which aqueous phases containing one or more chemically active substances in solution act on the wafer surfaces, consisting of spraying a water mist over the wafer surfaces and then introducing chemically active substances in the gaseous state so that these gaseous substances combine with the water mist so that there is an interaction of the gas phase and the liquid phase taking place on the surface of the semiconductor wafer. Gases such as hydrogen fluoride, chlorine and ozonized oxygen or other halogen gases act on the wafer surfaces between rinsing steps so that when the wafers are dried, the surfaces achieve extremely high cleanliness levels.

18 Claims, 0 Drawing figures

Exemplary Claim Number: 1

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw	Desc	Image							

KWAC

☐ **22. Document ID: US 5158100 A**

L15: Entry 22 of 22

File: USPT

Oct 27, 1992

US-PAT-NO: 5158100

DOCUMENT-IDENTIFIER: US 5158100 A

TITLE: Wafer cleaning method and apparatus therefor

DATE-ISSUED: October 27, 1992

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Tanaka; Masato	Hikone			JP
Nishizawa; Hisao	Hikone			JP
Hirai; Nobuyuki	Hikone			JP
Shinbara; Kaoru	Hikone			JP
Yoshioka; Hitoshi	Hikone			JP

US-CL-CURRENT: [134/105](#); [134/108](#), [134/902](#)

## ABSTRACT:

A wafer cleaning method and apparatus in which a cleaning solution is caused to evaporate at a temperature below its boiling point, and cleaning vapor thus produced is applied at a temperature above its dew point to a wafer such as a semiconductor wafer. The wafer is cleaned without formation of colloidal silica in the absence of aerosol, or etched uniformly free of impurities. The wafer cleaning apparatus comprises a cleaning solution storage, a vapor generating section, a wafer supporting position of a wafer supporting device and a vapor supply section. These components are arranged in a housing to overlap one another in plan view and to lie vertically close to one another. The apparatus has a compact overall construction with simplified seals for preventing leakage of the cleaning vapor.

5 Claims, 14 Drawing figures

Exemplary Claim Number: 3

Number of Drawing Sheets: 11

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KVMC

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Term	Documents
134/2.EPAB,JPAB,USPT,PGPB.	1895
134/2S	0
134/3.EPAB,JPAB,USPT,PGPB.	1916
134/3S	0
134/19.EPAB,JPAB,USPT,PGPB.	616
134/19S	0
134/26.EPAB,JPAB,USPT,PGPB.	1111
134/26S	0
134/30.EPAB,JPAB,USPT,PGPB.	935
134/30S	0
134/33.EPAB,JPAB,USPT,PGPB.	475
(L14 AND ((134/2 OR 134/3 OR 134/19 OR 134/26 OR 134/30 OR 134/33 OR 134/37 OR 134/902).CCLS.)).USPT,PGPB,JPAB,EPAB,DWPI,TDBD.	22

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**Search Results - Record(s) 1 through 10 of 22 returned.**☐ 1. Document ID: US 20020170573 A1

L15: Entry 1 of 22

File: PGPB

Nov 21, 2002

PGPUB-DOCUMENT-NUMBER: 20020170573  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20020170573 A1

TITLE: Rinsing processes and equipment

PUBLICATION-DATE: November 21, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Christenson, Kurt K.	Minnetonka	MN	US	
Nelson, Steven L.	Minnetonka	MN	US	
Oikari, James R.	New Brighton	MN	US	
Olson, Jeff F.	Burnsville	MN	US	
Wu, Biao	Milpitas	CA	US	

US-CL-CURRENT: 134/2; 134/153, 134/30, 134/33, 134/58R, 134/902, 134/95.2

## ABSTRACT:

Described are methods of rinsing and processing devices such as semiconductor wafers wherein the device is rinsed with using a surface tension reducing agent; the method may include a subsequent drying step which preferably incorporates the use of a surface tension reducing agent during at least partial drying; and the method may be performed using automated rinsing equipment; also described are automated rinsing apparatuses useful with the method.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KMC

☐ 2. Document ID: US 20020157686 A1

L15: Entry 2 of 22

File: PGPB

Oct 31, 2002

PGPUB-DOCUMENT-NUMBER: 20020157686  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20020157686 A1

TITLE: Process and apparatus for treating a workpiece such as a semiconductor wafer

PUBLICATION-DATE: October 31, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Kenny, Michael	Kalispell	MT	US	
Aegeter, Brian	Kalispell	MT	US	
Bergman, Eric	Kalispell	MT	US	
Scranton, Dana	Kalispell	MT	US	

US-CL-CURRENT: 134/1.3; 134/153, 134/21, 134/28, 134/30, 134/33, 134/34, 134/902, 134/95.3

ABSTRACT:

In a system for cleaning a workpiece or wafer, a boundary layer of heated liquid is formed on the workpiece surface. Ozone is provided around the workpiece. The ozone diffuses through the boundary layer and chemically reacts with contaminants on the workpiece surface. A jet of high velocity heated liquid is directed against the workpiece, to physically dislodge or remove a contaminant from the workpiece. The jet penetrates through the boundary layer at the point of impact. The boundary layer otherwise remains largely undisturbed. Preferably, the liquid includes water, and may also include a chemical. Steam may also be jetted onto the workpiece, with the steam also physically removing contaminants, and also heating the workpiece to speed up chemical cleaning. The workpiece and the jet of liquid are moved relative to each other, so that substantially all areas of the workpiece surface facing the jet are exposed at least momentarily to the jet. Sonic or electromagnetic energy may also be introduced to the workpiece.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KWOC

☐ 3. Document ID: US 20020088478 A1

L15: Entry 3 of 22

File: PGPB

Jul 11, 2002

PGPUB-DOCUMENT-NUMBER: 20020088478

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020088478 A1

TITLE: METHOD FOR REMOVING ORGANIC CONTAMINANTS FROM A SEMICONDUCTOR SURFACE

PUBLICATION-DATE: July 11, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
DEGENDT, STEFAN	WIJNEGEM		BE	
SNEE, PETER	VELTEM-BEISEM		DE	

US-CL-CURRENT: 134/3; 134/19, 134/26

ABSTRACT:

A method for removing organic contaminants from a semiconductor surface whereby the semiconductor is held in a tank and the tank is filled with a fluid such as a liquid or a gas. Organic contaminants, such as photoresist, photoresidue, and dry etched residue, occur in process steps of semiconductor fabrication and at times, require removal. The organic contaminants are removed from the semiconductor surface by holding the semiconductor inside a tank. The method may be practiced using gas phase processing or liquid phase processing. The tank is filled with a gas mixture, a liquid, and/or a fluid, such as water, water vapor, ozone and/or an additive acting as a scavenger (a substance which counteracts the unwanted effects of other constituents of the system).

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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KMC

☐ 4. Document ID: US 20020066464 A1

L15: Entry 4 of 22

File: PGPB

Jun 6, 2002

PGPUB-DOCUMENT-NUMBER: 20020066464

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020066464 A1

TITLE: Processing a workpiece using ozone and sonic energy

PUBLICATION-DATE: June 6, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Bergman, Eric	Kalispell	MT	US	

US-CL-CURRENT: 134/1; 134/102.1, 134/107, 134/186, 134/28, 134/30, 134/36, 134/95.2, 134/95.3

## ABSTRACT:

An apparatus for processing a semi-conductor wafer or similar workpiece has one or more liquid outlets for applying a heated process liquid to the wafer within a process chamber. Ozone gas is provided into the chamber directly, or via the processed liquid. Sonic energy is introduced to the workpiece through a layer of liquid. In an alternative design, the wafers are immersed in heated process liquid, and an ozone atmosphere is provided above the liquid. The wafers are then lifted out of the liquid, or the liquid is alternatively drained off. The ozone gas/liquid interface passes down across the surfaces of the wafers.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KMC

☐ 5. Document ID: US 20020050279 A1

L15: Entry 5 of 22

File: PGPB

May 2, 2002

PGPUB-DOCUMENT-NUMBER: 20020050279

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020050279 A1

TITLE: Process and apparatus for treating a workpiece with hydrofluoric acid and ozone

PUBLICATION-DATE: May 2, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Bergman, Eric J.	Kalispell	MT	US	

US-CL-CURRENT: 134/3; 134/19, 134/2, 134/26, 134/28, 134/30, 134/31, 134/32, 134/33, 134/34, 134/35, 134/41

## ABSTRACT:

A workpiece or substrate is placed in a support in a reaction chamber. A heated process liquid is sprayed onto the substrate. The thickness of the layer of process liquid formed on the substrate is controlled, e.g., by spinning the substrate. Ozone is introduced into the reaction chamber by injection into the liquid or into the reaction chamber, while the temperature of the substrate is controlled, to chemically process the substrate. The substrate is then rinsed and dried.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWIC
Drawn Desc	Image									

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☐ 6. Document ID: US 20020020436 A1

L15: Entry 6 of 22

File: PGPB

Feb 21, 2002

PGPUB-DOCUMENT-NUMBER: 20020020436  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20020020436 A1

TITLE: Process and apparatus for treating a workpiece with steam and ozone

PUBLICATION-DATE: February 21, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Bergman, Eric J.	Kalispell	MT	US	

US-CL-CURRENT: 134/30; 134/19, 134/2, 134/26, 134/28, 134/3, 134/31, 134/35, 134/36,  
134/37, 134/41, 134/42

## ABSTRACT:

In a method for processing a workpiece to remove material from a first surface of the workpiece, steam is introduced onto the first surface under conditions so that at least some of the steam condenses and forms a liquid boundary layer on the first surface. The condensing steam helps to maintain the first surface of the workpiece at an elevated temperature. Ozone is provided around the workpiece under conditions where the ozone diffuses through the boundary layer and reacts with the material on the first surface. The temperature of the first surface is controlled to maintain condensation of the steam.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWIC
Drawn Desc	Image									

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☐ 7. Document ID: US 20020011257 A1

L15: Entry 7 of 22

File: PGPB

Jan 31, 2002

PGPUB-DOCUMENT-NUMBER: 20020011257  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20020011257 A1

TITLE: METHOD FOR REMOVING ORGANIC CONTAMINANTS FROM A SEMICONDUCTOR SURFACE

PUBLICATION-DATE: January 31, 2002

## INVENTOR-INFORMATION:



NAME	CITY	STATE	COUNTRY	RULE-47
DEGENDT, STEFAN	WIJNEGEM		BE	
SNEE, PETER	VELTEM-BEISEM		BE	
HEYNS, MARC	LINDEN		BE	
MERTENS, PAUL	Haacht		BE	
MEURIS, MARC	KEERBERGEN		BE	

US-CL-CURRENT: 134/3; 134/2, 134/26, 438/745

## ABSTRACT:

A method for removing organic contaminants from a semiconductor surface whereby the semiconductor is held in a tank and the tank is filled with a fluid such as a liquid or a gas. Organic contaminants, such as photoresist, photoresidue, and dry etched residue, occur in process steps of semiconductor fabrication and at times, require removal. The organic contaminants are removed from the semiconductor surface by holding the semiconductor inside a tank. The method may be practiced using gas phase processing or liquid phase processing. The tank is filled with a gas mixture, a liquid, and/or a fluid, such as water, water vapor, ozone and/or an additive acting as a scavenger (a substance which counteracts the unwanted effects of other constituents of the system).

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw	Desc	Image							

KMC

☐ 8. Document ID: US 20010042555 A1

L15: Entry 8 of 22

File: PGPB

Nov 22, 2001

PGPUB-DOCUMENT-NUMBER: 20010042555

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20010042555 A1

TITLE: Apparatus and method for delivering a treatment liquid and ozone to treat the surface of a workpiece

PUBLICATION-DATE: November 22, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Bergman, Eric J.	Kalispell	MT	US	
Hess, Mignon P.	Kalispell	MT	US	

US-CL-CURRENT: 134/1.3; 134/102.1, 134/148, 134/153, 134/157, 134/25.4, 134/33, 134/902, 134/95.3

## ABSTRACT:

An apparatus for supplying a mixture of a treatment liquid and ozone for treatment of a surface of a workpiece, and a corresponding method are set forth. The preferred embodiment of the apparatus comprises a liquid supply line that is used to provide fluid communication between a reservoir containing the treatment liquid and a treatment chamber housing the workpiece. A heater is disposed to heat the workpiece, either directly or indirectly. Preferably, the workpiece is heated by heating the treatment liquid that is supplied to the workpiece. One or more nozzles accept the treatment liquid from the liquid supply line and spray it onto the surface of the workpiece while an ozone generator provides ozone into an environment containing the workpiece.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KWC

☐ 9. Document ID: US 6290777 B1

L15: Entry 9 of 22

File: USPT

Sep 18, 2001

US-PAT-NO: 6290777

DOCUMENT-IDENTIFIER: US 6290777 B1

TITLE: Method and device for washing electronic parts member, or the like

DATE-ISSUED: September 18, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Imaoka; Takashi	Toda			JP
Yamashita; Yukinari	Toda			JP

US-CL-CURRENT: 134/1; 134/1.3, 134/2, 134/3

## ABSTRACT:

An electronic parts members, or the like, such as the silicon wafer, etc., is washed with wash water. The wash water is prepared by dissolving a hydrogen gas or ozone gas in ultra pure water and has a negative or positive oxidation-reduction potential. This wash water has remarkably improved detergency for electronic parts. In addition, when the pH of the wash water is adjusted, the electronic parts members can be washed more effectively.

26 Claims, 5 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 4

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KWC

☐ 10. Document ID: US 6273108 B1

L15: Entry 10 of 22

File: USPT

Aug 14, 2001

US-PAT-NO: 6273108

DOCUMENT-IDENTIFIER: US 6273108 B1

TITLE: Apparatus and method for processing the surface of a workpiece with ozone

DATE-ISSUED: August 14, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bergman; Eric J.	Kalispell	MT		
Hess; Mignon P.	Kalispell	MT		

US-CL-CURRENT: 134/102.1; 134/103.1, 134/105, 134/111, 134/902, 134/95.3

## ABSTRACT:

An apparatus for supplying a mixture of a treatment liquid and ozone for treatment of a surface of a workpiece, and a corresponding method are set forth. The preferred embodiment of the apparatus comprises a liquid supply line that is used to provide fluid communication between a reservoir containing the treatment liquid and a treatment chamber housing the workpiece. A heater is disposed to heat the workpiece, either directly or indirectly. Preferably, the workpiece is heated by heating the treatment liquid that is supplied to the workpiece. One or more nozzles accept the treatment liquid from the liquid supply line and spray it onto the surface of the workpiece while an ozone generator provides ozone into an environment containing the workpiece.

21 Claims, 6 Drawing figures

Exemplary Claim Number: 13

Number of Drawing Sheets: 6

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

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134/2.EPAB,JPAB,USPT,PGPB.	1895
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134/19.EPAB,JPAB,USPT,PGPB.	616
134/19S	0
134/26.EPAB,JPAB,USPT,PGPB.	1111
134/26S	0
134/30.EPAB,JPAB,USPT,PGPB.	935
134/30S	0
134/33.EPAB,JPAB,USPT,PGPB.	475
(L14 AND ((134/2 OR 134/3 OR 134/19 OR 134/26 OR 134/30 OR 134/33 OR 134/37 OR 134/902).CCLS.)) USPT,PGPB,JPAB,EPAB,DWPI,TDBD.	22

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